

STEREO MOC Status Report
Time Period: 2014:286 - 2014:292

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 290, no real-time science telemetry was downlinked as the scheduled 70 meter support with DSS-63 was changed to a 34 meter support with DSS-55 in support of the STEREO Behind communication recovery.
- On day 290, during the DSS-55 support, initial telemetry acquisition was delayed by eight minutes until 0718z due to a DSN receiver problem that caused the telemetry output block count to stop updating. Another receiver was added to resolve the anomaly. See DR #M108396 more information.
- On day 291, no real-time science telemetry was downlinked during the second support that day as the scheduled 70 meter with DSS-43 was changed to a 34 meter support with DSS-35 in support of the STEREO Behind communication recovery.
- On day 292, no real-time science telemetry was downlinked as the scheduled 70 meter support with DSS-14 was changed to a 34 meter support with DSS-26 in support of the STEREO Behind communication recovery.

2. The following spacecraft/instrument events occurred during this week. Note that the Ahead observatory is operating on the first side lobe of the HGA to prevent overheating of the HGA feed assembly.

- During days 279 through 285, SWAVES science APIDs 0x503 and 0x504 were not downlinked in real-time telemetry as the corrected RTDFD table had not yet been loaded to the Ahead observatory. The corrected RTDFD table, RTDFD #12, was loaded to the Behind observatory first to test after the planned momentum dump on day 271. This worked as expected with the SWAVES science APIDs flowing after the momentum dump. However, due to the Behind solar conjunction spacecraft testing and subsequent loss of communication anomaly, the corrected RTDFD was never loaded to the Ahead

observatory. On day 293, at 1300z, the SWAVES spooler queue was unblocked by using RTDFD #17, which has a wider SWAVES science range, 0x502 through 0x56F, for one hour before the start of the pass at 1440z. During the subsequent DSS-14 support, DHS release 1.1.9 was loaded successfully to C&DH RAM and EEPROM. This release contained only the corrected RTDFD #12.

- The average daily science data return for Ahead, while operating on the first side lobe on the HGA, was 39 Mbits during this week.

STEREO Behind (STB) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- None.

2. Detailed status of the activities that occurred this week on the Behind loss of communication anomaly, which occurred on day 274, are listed below. The project has requested three hour 70 meter supports every 12 hours through day 292 to re-establish communications while avoiding the level 3 Comet Siding Springs observations by the Mars missions on days 292 and 293.

- On day 286, during the DSS-43 support, contingency commanding was resumed, after being discontinued for three days to allow the hard command loss timer to reset the observatory. Contingency commanding focused on ensuring that the TWTA is transmitting and the star tracker is in its operational AAD mode. No signal was received by the DSN radio science receivers.
- On day 287, during the DSS-63 and 43 supports, contingency commanding continued with ensuring that the TWTA is transmitting and the star tracker is in its operational AAD mode. No signal was received by the DSN radio science receivers.
- On day 288, during the DSS-63 support, contingency commanding continued with ensuring that the TWTA is transmitting and the star tracker is in its operational AAD mode. No signal was received by the DSN radio science

receivers. The Green Back radio telescope listened for the Behind downlink signal for 2.8 hours. The telescope was first calibrated using the STEREO Ahead signal, which was as expected, however, no signal from Behind was detected. With a diameter of 100 meters, this telescope has twice the effective area as the DSN 70 meter stations. Unfortunately, the observing window has set till the Spring for the 305 meter Arecibo Observatory's view of STEREO Behind. During the DSS-43 support later this day, contingency commanding continued with ensuring that IMU-A is disabled as it has failed and only commanding at the emergency uplink rate, 7.8 bps. No signal was received by the DSN radio science receivers.

- On day 289, during the DSS-63 support, contingency commanding continued with ensuring that IMU-A is disabled as it has failed. No signal was received by the DSN radio science receivers. The Green Back radio telescope again listened for the Behind downlink signal for 2.5 hours. During the DSS-14 support later this day, contingency commanding continued with ensuring that IMU-A is disabled as it has failed. No signal was received by the DSN radio science receivers.
- On days 290, 291, and 292, during the two 70 meters each day, contingency commanding continued with ensuring that IMU-A is disabled as it has failed. No signal was received by the DSN radio science receivers.

Significant findings to date:

1. Analysis of the three DSN extracted telemetry frames from the carrier signal just before the planned observatory reset/anomaly occurred on October 1st, showed nominal performance of the spacecraft, i.e., no anomalies, IMU off, and the star tracker providing an attitude solution.
2. Post reset, from the very limited telemetry, three packets, extracted from the carrier signal, the X-axis gyro on IMU-A had failed. Unfortunately, this telemetry contained only G&C anomaly data and no spacecraft summary data, i.e., the state of the RF, G&C, fault protection and other subsystems is not known at the time of the anomaly. With a failed IMU and the star tracker being off-line for an undetermined duration, the sun sensors will keep the observatory pointed at the Sun, though the G&C will not have any roll knowledge, and cannot roll the observatory as part of the

safing configuration to re-establish communications on the LGAs. From analysis of this telemetry, it is highly suspected that the observatory is rotating due to an autonomous momentum dump initiated by bad gyro data flagged good, but this has not yet been confirmed. G&C simulations using the bad gyro data flagged good are being conducted to better understand the potential impact to the observatory state.

3. At least two anomalies occurred post reset, the star tracker not promoting to AAD mode and the X-axis gyro failure. Unfortunately, due to the number of possible combinations, the STEREO fault protection system is not designed for simultaneous failures.

The cause of the anomaly and why no signal has been received from the LGAs is continuing to be actively investigated.

The project has requested three hour 70 meter DSN supports every 21 hours through day 313 to re-establish communications. This ensures that communications on an LGA will be attempted daily. Once communications are restored and the anomaly resolved, the operational plan for exiting the solar conjunction testing will continue to return the BEHIND observatory back to nominal science data collection as soon as safely possible.